PROC. ENTOMOL. SOC. WASH.
87(2), 1985, pp. 392–394

NEW RECORDS FOR *STIGMATOMYCES VERRUCULOSUS* THAXTER (ASCOMYCETES: LABOULBENIACEAE), A FUNGAL PARASITE OF ADULT TEPHRITIDAE (DIPTERA) IN SOUTHERN CALIFORNIA

R. D. Goeden and R. K. Benjamin

(RDG) Department of Entomology, University of California, Riverside, California 92521; (RKB) Rancho Santa Ana Botanic Garden, Claremont, California 91711.

Abstract.—Males of *Paroxyna americana* Hering, *Tephritis araneosa* (Coquillett), and *T. californica* Doane are reported for the first time as hosts of the laboulbeniaceous fungus, *Stigmatomyces verruculosus*. The known geographic range of this fungus is extended to and across North America from the Caribbean. The locations of the thalli of this fungus on infected flies are described.

This paper reports new collection records from California for, and observations on, Tephritini adults (Diptera: Tephritidae) infested with the minute, nearly microscopic, ectoparasitic fungus, *Stigmatomyces verruculosus* Thaxter (Ascomycetes: Laboulbeniaceae). The few-celled body or "thallus" of this fungus, like that of most Laboulbeniales, is attached by a blackened holdfast or "foot" to the exoskeleton of the host (Thaxter, 1896).

On October 1, 1981, RDG swept a male of *Tephritis californica* Doane from flowering *Baccharis pilularis* de Candolle (Asteraceae), a male of *T. araneosa* (Coquillett) from flowering *Artemesia californica* Lessing (Asteraceae), and a male of *Paroxyna americana* Hering from flower heads of *Heterotheca grandiflora* Nuttal (Asteraceae) in Cervada Canyon on Santa Cruz Island, Santa Barbara Co., off the coast of southern California. All three flies were infected with *S. verruculosus* subsequently identified by RKB. On October 13, 1983, RDG swept three males of *T. araneosa* infected with *S. verruculosus* from flowering *A. californica* 1 to 2 m above sea level at Willows Anchorage on Santa Cruz Island. Four females of *T. araneosa* subsequently were reared from a quantity of flower heads of *A. californica* collected on the same date from the plants swept at Willows Anchorage.

On September 9, 1982, RDG swept five males of *P. americana* from flower heads of *Haplopappus pinifolius* Gray (Asteraceae) at ca. 1500 m elevation near Paradise Valley in the San Bernardino National Forest, Riverside Co. All five flies were infected with *S. verruculosus*, which, at least on the two specimens examined microscopically by RKB, were found to be only about half mature. None bore perithecia containing mature ascospores.

Three each, dry, point-mounted specimens of the above *P. americana* and *T. araneosa*, not dissected in saline for mycological examination by RKB, were examined 100× with a Wild steromicroscope and the following placement of

thalli of *S. verruculosus* recorded (nomenclature after Bessey (1950) and McAlpine (1981)): for *P. americana,* (1) small group of thalli on left meron; (2) small row of thalli along ventral margin of left gena, group of three thalli from between hind coxae, and a thallus at base of arista of right antenna; (3) several thalli on upper surface of left wing along proximal part of costal vein and on subcostal vein; for *T. araneosa,* (1) thalli arising from ventral surfaces of coxa of midleg and its juncture with midfemur, from left and right katepisternum, from ventral base of left forefemur and its ventral juncture with left forecoxa, and from ventral base of right forefemur; (2) thalli arising from ventral surfaces at base of left hindfemur and left hindcoxa, from ventral surface at base of left midfemur, from ventral surface at base and middle of right forefemur, from right postgena and left margin of frontoclypeal membrane; (3) thalli arising from middle of sternites 3, 4, and 5 and from ventral side of abdominal terminalia; from ventral surfaces of left and right hind coxae, and from middle of ventral surface of left hindtibia.

Discussion.—The genus *Stigmatomyces* commonly occurs on various Diptera. Four species of *Stigmatomyces* on Tephritidae (as Trypetidae) are: *S. aciurae* Thaxter (1917) on *Aciurina* (as *Aciura*) sp. and *Ensina* sp. from Jamaica; *S. dacinus* Thaxter (1918) on *Dacus* sp. from Borneo; *S. ensinae* Thaxter (1917) on *Ensina* sp. from Jamaica; and *S. verruculosus* Thaxter (1917) on *Ensina* sp. from Jamaica and Grenada. Recently, Balazuc (1982) described *S. autriquei* Balazuc from *Dioxyna sororcula* (Wiedemann) from Burundi in Africa.

Ours are the first records from North America for *S. verruculosus,* and the first tephritid host records from *Paroxyna* and *Tephritis* for *Stigmatomyces. Paroxyna americana, T. araneosa,* and *T. californica* were initially reported herein from Santa Cruz Island (Foote and Blanc, 1963; Novak, 1974; Miller and Menke, 1981); and *P. americana,* initially from Riverside Co. (Foote and Blanc, 1963). The new rearing of *T. araneosa* from *A. californica* and known utilization of *B. pilularis* and *H. grandiflora* flower heads by *T. californica* and *P. americana,* respectively (Wasbauer, 1972), indicate that seasonal synchronization with tephritid adult and flowering host plant, is involved in the life cycle of *S. verruculosus.*

Inter- and intraspecific variation was recorded in the locations of thalli of *S. verruculosus* on the few tephritids examined. Thalli on the three *T. araneosa* males showed a distinct tendency to cluster on the thoracic and abdominal venters. A position specificity of thalli ventrally on males and dorsally on females related to their copulatory postures has been reported for both Coleoptera and Diptera (Benjamin and Shanor, 1952; Whisler, 1968). Grooming movements in tephritids normally involve brushing the legs over the antennae, head, and wings and may have been the activity responsible for the secondary transfer of ascospores that resulted in the infection of the frontoclypeal membrane in *T. araneosa.* However, the immature thalli found on head and wing of *P. americana* suggested that these were locations of primary, not secondary infections.

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